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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/778,589	02/07/2001	Ali S. Khayrallah	4015-891	4636
24112	7590	12/05/2005	EXAMINER	
COATS & BENNETT, PLLC			CHANG, EDITH M	
P O BOX 5			ART UNIT	
RALEIGH, NC 27602			PAPER NUMBER	
			2637	

DATE MAILED: 12/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

4K

Office Action Summary	Application No.	Applicant(s)	
	09/778,589	KHAYRALLAH, ALI S.	
	Examiner	Art Unit	
	Edith M. Chang	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5-13,15,18-25,29-40 and 43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5-13,15,18-25,29-40 and 43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Drawings***

1. The drawings were received on Sep 23, 2005. These drawings are acceptable.

Response to Arguments/Remarks

2. Applicant's arguments filed on September 23, 2005, have been fully considered but they are not persuasive. The 35 U.S.C. 103 rejections are upheld.

Argument: Regarding claims 1 and 25, Applicants argues that nothing in Seshadri teaches or suggests differentially encoding a protected bit of an input symbol with respect to a less protected bit of a previous symbol.

Response: Seshadri ('501) discloses a system/apparatus and it method of coding digital signals comprising bits with different importance/protection classes (column 4, lines 12-19), wherein class 1 (k_1) is most important (protected) and class 3 (k_3) is the least important of the three in FIG.1. In FIG.4, the encoding output \underline{b} (column 6, lines 40-45) of the encoder comprises a protected bit b_1 of time instance j of an input symbol with respect to a less protected bit b_2 of the previous time instance $j-1$ (the superscripts J from 1 to M denote time, column 6, lines 30-32), hence, Seshadri teaches/suggests encoding a protected bit of an input symbol with respect to a less protected bit of a previous symbol.

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Seshadri discloses the encoding scheme is differential phase shift keyed (DPSK) modulation, wherein the phase angle of each signal point indicates a change that the phase of the transmitted signal must undergo in order to transmit the bit pattern associated with that particular signal point (column 5, lines 5-10 '501), and by definition of DPSK modulation, it is well-known in the art that Differential phase shift keying (DPSK) modulates a carrier with the changes in phase occurring between successive symbol periods. Therefore, Seshadri teaches/suggests differentially encoding a protected bit of an input symbol with respect to a less protected bit of a previous symbol.

Argument: Applicant argues that Ho has nothing to do with the claimed differential encoding process (claim 1) or the claimed differential encoder (claim 25).

Response: Claims 1 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. ('501) in view of Ho et al. ('770). In the rejection of claims 1 and 25 of the previous Office action states that Seshadri et al. does not explicitly show the detail of *the well-known* DPSK modulation, Ho et al. teaches the MPSK (with Dif. Encoder) in FIG.1 (column 3, lines 45-61 '770). Ho et al. as one of the prior arts describes the well-known differential encoder in the phase shifted keying modulation, hence, Ho et al. teaches the well-known differentially encoding bits of input symbols.

Argument: Applicant argues that while DPSK processes use phase information from a previous mapped symbol, this does not suggest using phase information from a mapped symbol associated with a different sub-stream.

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Instead, this combination simply suggests differentially encoding the phase of a symbol from a mapped sub-stream based on a phase of a previous symbol associated with the same sub-stream.

Response: “different sub-stream” and “same sub-stream” are not limitations recited in the claims.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 5-10, 12, 25, 29-33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 5,289,501) in view of Ho et al. (US 6,072,770).

Regarding **claims 1 & 25**, in FIG. 1, Seshadri et al. teaches a transmitter of code modulation with unequal error protection. The multi-level encoder 120 (channel coder) provides an encoded sequence 121 to the modulator 151 (the input of 151 as the input sequence), in turns to provide a transmit sequence transmitted over antenna 152 based on the sequences 121 with different coding classes (less or more protected, column 4 lines 12-19) with respect to a less protected bit (column 6, lines 40-45) of a previous symbol (column 6, lines 30-

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32); and a DPSK modulation (131 & 152, column 4 line 66-column 5 line 10) to broadcast the transmit sequence via antenna 152 (column 4 lines 59-63).

However Seshadri et al. does not explicitly show the detail of the well-known DPSK modulation, Ho et al. teaches the MPSK Modulation technique in FIG. 1 (column 3 lines 45-61 '770) that the coded information bits $\sim(n)$ are differentially coded with respect to information bits of previous symbols $\sim(n-1)$ (Dif Encoder 12 of FIG.1). At the time of the invention was made, it would have been obvious to one of ordinary skill in the art to implement the basic elements of the MPSK (MPSK Mapper, DifEncoder, MPSK Modulator) taught by Ho et al. in Seshadri et al.'s DPSK transmitter (Constellation Mapper and Modulator) that the different protections bit(s) (one or more bits) of a symbol in the sequence 121 is differentially coded. The combination/modification gains the benefit of a simple mechanism for demodulating and separating individual signals transmitted on the fading channels (CDMA channels, column 2 lines 61-64 '770).

Regarding **claims 5-6 & 29-30**, the combined/modified Seshadri et al.'s transmitter with Ho et al.'s teaching discloses the information bits of previous symbols comprising at least one unprotected bit and other combinations (column 13 lines 1-11, wherein the combination of different codes can include one code of "no coding" i.e. unprotected '501).

Regarding **claims 7-10 & 31-33**, in FIG. 1, Seshadri et al, teaches the input sequence (input of modulator 151) comprising the multi-level encoding bits (from 121) with different error coding of an unequal error protection scheme (column 3 lines 62-67 & column 4 lines 12-19) based on the sequence from the

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speech signal source 101 to produce a coded sequence (out put of 141 interleaver).

Regarding **claims 12 & 35**, in FIG. 1, Seshadri et al. teaches modulating a carrier with the transmit sequence to provide a transmit signal transmitted over the antenna 152 (column 1 lines 6-12).

5. Claims 11 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 5,289,501) in view of Ho et al. (US 6,072,770) as applied to claims 1 and 25 above, and further in view of Lee et al. (US 6,289,486).

Regarding **claims 11 & 34**, Seshadri et al. does not specify the type of interleaver, however Lee et al. teaches the diagonal interleaver in FIG. 5. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the diagonal interleaver taught by Lee et al. in Seshadri et al.'s interleaver for the purpose of providing a flexible system to interleaving the input data regardless the frame size (column 2 line 60-67 '486).

6. Claims 13, 15, 18-24, 36-40 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshadri et al. (US 5,289,501) in view of Ho et al. (US 6,072,770) and Khaled et al. (US 5,416,804).

Regarding **claims 13, 20, 36-37 & 40**, in FIG.2, Seshadri et al. teaches a receiver with a front end processing 211 including a demodulator for demodulation and an equalizer for equalization (column 12 lines 15-24) the

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received signal from antenna 201; and a multi-level decoder 231 (as the channel decoder) decoding bits of unequal error protections (column 12 lines 28-31).

However Seshadri et al. does not explicitly show the detail of the well-known DPSK demodulation, Ho et al. teaches the MPSK demodulation technique in FIG.2. At the time of the invention was made, it would have been obvious to one of ordinary skill in the art to implement the basic elements of the demodulation of MPSK (Noncoherent Qua. Demodulator 21, Difdecoder 25 & 27, column 4 lines 21-24, lines 34-40) taught by Ho et al. in Seshadri et al.'s DPSK receiver (211 implemented with the demodulator 21, and Difdecoder 25 & 27 of Ho) that the different protections bit(s) (one or more bits) of a symbol in the received sequence (input of 231 '501) is differentially decoded with respect to bits of a previous received symbol; and

Seshadri et al. does not specify the re-encoder of a multi-pass demodulator, in FIG.4/FIG.5, Khaled et al. teaches the re-encoder (46₁) of a multistage decoder having two error protection stages (column 5 lines 67-68 '804), wherein the re-encoded bits (as the pilot bits) are fed back from the decoder 45₁ (INT) and the decoder 44₁ (EXT) to the detector 40₂ (the modulator, the second path). At the time of the invention was made, it would have been obvious to one of ordinary skill in the art to implement the re-encoders taught by Khaled et al. (FIG.5 '804) in the multi-level decoder (231 FIG.2 '501) to produce k; to the speech decoder (253 FIG.2 '501) for the purpose of improving the performance of decoding and maintaining the simplicity of the decoder (column 3 lines 50-56).

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Regarding **claims 15 & 38**, the combined/modified Seshadri et al.'s receiver discloses the front end processing 211 and multi-level decoder (as the equalizer) to perform demodulating and differential decoding.

Regarding **claims 18, 19 & 39**, the combined/modified Seshadri et al.'s receiver discloses outputting the re-encoded bits from the re-encoder (from 46s FIG.4 '804) from the multi-level decoder (the channel decoders of 44s and 45s).

Regarding **claims 21-24 & 43**, the combined/modified Seshadri et al.'s transmitter with Ho et al.'s teaching discloses the information bits of previous symbols comprising at least one unprotected bit and other combination (column 13 lines 1-11, wherein the combination of different codes can include one code of "no coding" i.e. unprotected).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tarallo (US 4,879,728) describes in the DPSK, the phase difference between symbols can be obtained by mixing the present symbol signal with the preceding symbol signal.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory

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action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M. Chang whose telephone number is 571-272-3041. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay K. Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Edith Chang
November 29, 2005

A handwritten signature in cursive script, appearing to read 'Khai Tran'.

KHAI TRAN
PRIMARY EXAMINER